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SCIENCE AND TECHNOLOGY

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7 March 1986

JAPAN REPORT
SCIENCE AND TECHNOLOGY

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ELECTRONICS

HITACHI, FUJITSU, NIKON, CANON PERSONNEL CHANGES DISCUSSED

Tokyo ZAIKAI TEMBO in Japanese Jul 85 pp 48-51

[Text] Both Hitachi, Ltd. and Fujitsu, Ltd. regard mainframe computers as the main line of their business, and produce computers that are mutually compatible with computers of International Business Machines Corp. (IBM), which occupies 70 percent of the world's computer market. Of course, Hitachi, which also produces heavy electrical machinery and home electrical appliances, is an integrated electrical enterprise leading the industry. But when it comes to computers, both companies compete on the same foundation. With the strategy vis-a-vis IBM having direct bearing on their business administration, it is indispensably essential for the top leaders of both companies to work out a long-term program, while retaining their positions on a long and stable basis.

Mita Overcomes Difficulties

It is an unwritten law for a Hitachi president to serve for a period of 10 years. Hitachi, which observes the 75th anniversary of its founding this year, believes that a period of 10 years is required for a person to develop and exert his ability, and that for a president himself to display his affluent personality while developing his successor would require 10 years.

In fact, Kenichi Komai and Hirokichi Yoshiyama, the third and fourth presidents, both served for 10 years, unlike Rohei Kodaira, the founder and first president, and Shuzei Kurata, the second president, who both served for 14 years. Katsushige Mita, the fifth and the incumbent president, is assured of a 10-year tenure of office.

President Mita made his debut when the company was faced with not only domestic, but also international competition in the midst of stormy tides of technological innovation. Soon after he assumed the presidency, rumor circulated that his post would be passed to his successor earlier than generally believed. He then faced the surprising "IBM industrial espionage" incident only 1 year after his promotion to the presidency. "Although the Hitachi presidency is implicitly assured for a 10-year tenure, he would have to step down if found to be deficient in capabilities as president," says (a Hitachi Group related person). This incident was truly a severe ordeal for President Mita.

However, the circumstances turned favorable. Industrial sources said President Mita had overcome the incident and in a fine manner should be appraised as a corporate manager. Not only has the possibility now been totally ruled out that his successor would be chosen from among the managing directors, many now believe a long-term reign will be born following Kurata, the second president.

If this actually happens, 9 years would remain for the 61-year-old President Mita to serve before the president's retirement age of 70, as was the case of the third and fourth presidents. This means that calculating backward, the next successor will be chosen from those around 50 years who joined the company in 1959-1960 as the "prince."

At the present, the youngest directors on the board entered the company in 1952. The individual to be the successor would be from the factory chiefs class or deputy chiefs. However, one point that is clear is that the individual must be capable of being a leader among engineers and have characteristics for capably running the company for a 10-year period.

Unshakeable Yamamoto Regime

Fujitsu was founded in 1935 as the Fuji Tsushinki Seizo, by taking over automatic telephone exchange equipment, telephone receivers, and other telecommunications equipment from the Fuji Electric Co. (changed to current name in 1967). The company observes the 50th anniversary of its founding in June this year. Around 1955, the company launched the computer business under the leadership of the late President Kanjiro Okada. As a result of all-out research and development efforts, the company outranked IBM Japan, Ltd., in the domestic market as the top maker in fiscal 1979.

At a time when society is shifting into networks, a combination of computers (electronics) and telecommunications, Fujitsu, which handles computers and office automation (OA) equipment, telecommunications equipment, semiconductors, and electronic parts, can be said to be the favorite child of the day. Of course, on the other hand, the company is continuing an intense dead heat with NEC Corp., as an "elder" brother in the NTT family in addition to vying with the two giants, IBM and ATT, and cannot relax even for a moment.

Fujitsu is led by Board President Taiyu Kobayashi, born in 1912, and President Takuma Yamamoto, born in 1925. Kobayashi reigns over the company as an active board president and also engages in external activities as the chairman of the Information and Telecommunications Committee, Federation of Economic Organizations. His strong personality and actions sometimes cause repercussions in the nation's business community. His repeated "Kobayashi wars" with Koji Kobayashi, chairman of NEC, are well-known.

President Yamamoto has served two 2-year tenures up to June of this year since he took over the presidency from Kobayashi in 1981. Chairman Kobayashi now serves as a guardian of Yamamoto. Yamamoto graduated from the electric engineering course of Tokyo University's Engineering Faculty in 1949. His graduation was the same year as that of Hitachi's President Katsuhige Mita,

and assumption of presidency was also in the same year. Since Yamamoto assumed the presidency, the company's business has been expanding smoothly, assisted partly by the recovering economy. In the business year ending in March 1985, the company enjoyed increasing sales of semiconductors and other products, boosting overall sales by more than 30 percent over the previous year to Y1.3 trillion, registering the Y1 trillion mark for the first time.

Senior Managing Director Shoichi Ninomiya, who is in charge of the computer division, was regarded as a strong candidate for the next president at one time. He is the youngest among vice presidents and senior managing directors such as the "Taisho"-born (1920's) Vice President Yuichiro Koide, Executive Director Shiro Yoshikawa, Senior Managing Director Shintami Yasufuku, and Senior Managing Director/Vice President Bunichi Koguchi, formerly of NTT, an outsider. Winning popularity within the company, he has been praised for maintaining secrecy of contracts in the IBM industrial espionage case despite pressure from the mass media.

However, Ninomiya now seems unlikely to be promoted to the presidency in view of the small age gap with President Yamamoto, so the solid Kobayashi-Yamamoto regime will continue as long as Chairman Kobayashi's health conditions permit. On top of that, no promising presidential candidates are seen among the managing directors. Assessment has yet to be made within the company about Koichi Nozawa, who is the youngest board member (born 1932) and head of the computer business headquarters. Under such circumstances, the Yamamoto regime, becoming more stabilized by the years, doesn't seem to be shakeable.

Canon Waiting for Director Mitarai To Mature

Riding smoothly on the office automation (OA) boom, Canon Inc. boosted its sales to over Y480 billion in the business year ending December 1984. The company thus became the top manufacturer of precision instruments and office machinery, outranking Ricoh Co. (President Hiroshi Hamada) for the first time. Nobody denies that behind the achievements is President Ryuzaburo Kaku, who has served for 8 years. He was promoted to the presidency from the managing directorship, jumping over many senior board members. His "leaping power" was a topic of conversation although not comparable to that of Toshihiko Yamashita, president of Matsushita Electric Industrial Co.

This spring, Keizo Yamaji, top senior managing director and head of the Electronics Office Machinery Headquarters, was promoted to the vice presidency of Canon, drawing attention in the industrial circle. It was believed that Yamaji was appointed as a successor to the Kaku regime, which is generally acknowledged to be a 10-year reign.

It is true that vice presidency is the shortest distance to the presidency, but vice presidents are not always assured of the top post. In the case of Vice President Yamaji, there seems to be no such indications. Vice President Yamaji played a major role in developing Canon's office automation division--cameras and office machinery, particularly plain paper copiers (PPC). Despite being an engineer, he is a knowledgeable person and is of fine character, qualifying to be corporate head. But, he is not a cool-headed strategist.

That is the biggest reason for his not being able to be the president, although capable as vice president.

Canon was established by Tsuyoshi Mitarai, the then chairman who died last year. Having set up its foundation as a camera maker in one generation, the company is now opening a new era of office automation (OA) equipment and is also tackling research and development of next-generation products such as 8-mm videotape recorders (VTR) and optical computers. One should remember not only the leadership of the three Presidents Mitarai, Maeda, and Kaku, but also the existence of an able staff in the engineering sector which responded to the leadership. The company's personnel appointments are characterized by recruiting transferees from outside, as exemplified by Vice President Hiromoto Suzuki. It is not an overstatement to say that today's Canon is founded upon complicated hybrids.

The individual at the top must lead the company, including his able staff, to achieve a unified target. Otherwise the company would face a crisis following the observation of the 50th anniversary of its founding within 2 years. This makes it difficult to select the successor of President Kaku, a strategist who reads the "Sangokushi" as his constant guide. President Kaku undoubtedly is to preside over the 50th anniversary personally, and the question is when the baton will be passed. According to a daring forecast, it will be handed over to Ken Mitarai, director and president of Canon France in 1989, the 12th year of his reign. Nevertheless there is to be no such day for Seiichi Takikawa, president of Canon Sales, regarded as Kaku's rival at one time, or Yajime Mitarai, son of the late Chairman Mitarai.

Director Sho Strong Candidate for Fukuoka's Post

Nippon Kogaku, transforming from Nikon camera maker to a maker of steppers (a kind of semiconductor manufacturing equipment), has rapidly expanded business, riding on the waves of the semiconductor boom. This old-established Mitsubishi group company, producing cameras and optical equipment, is led by Naritada Fukuoka. After serving the first 2-year term until June, it appears certain that he will serve another 2 years to steer the newborn Nikon.

However, the race for the next presidency 2 years hence remains uncertain. It is a very difficult task to forecast the next president even with Nikon's high-resolution lens that can precisely focus on one-micron (1,000th of 1 millimeter) patterns of very large-scale integrated circuits (VLSI).

Of course, standing at the shortest distance from the next presidency is Vice President Seiya Miyazaki. Miyazaki, former senior managing director of the Mitsubishi Bank, joined Nikon when Fukuoka assumed the presidency 2 years ago. It was strongly rumored soon after the inauguration of the Fukuoka regime that Fukuoka might hand over the post to Vice President Miyazaki, after serving a single term.

However, Nikon's sales of semiconductor manufacturing and testing equipment have since been expanding sharply thanks to a worldwide boom of plant and equipment investment by semiconductor industries. The popularity of President

Fukuoka, who has developed this semiconductor equipment division, has been rising, along with the price of the Nikon stocks on stock exchanges. Fukuoka, who became the first president of the Association of the Japan Semiconductor Equipment Industry inaugurated this spring, is now acting as a leader of the semiconductor equipment industry, which is about to become a Y1 trillion industry.

As a result, the possibilities of President Fukuoka's stepping down after the initial 2-year term have been ruled out. President Fukuoka is likely to serve another term at least, and then step down from the frontline as he will be 69 in 2 years.

Senior Vice President Miyazaki and Managing Director Masanao Yamaguchi, who is to be promoted to the vice presidency in June, both will be 66 years old in 2 years. The next president is likely to be selected from board members who joined the company after the end of the war and who specialize in engineering. Among eligible candidates is Shigeya Nakamura, who was born in 1925 and joined the company in 1948.

In the case of Nikon, graduates from the precision engineering course of Tokyo University's Engineering Faculty are regarded as elite. President Fukuoka and many of his predecessors are graduates of the course. Therefore, Nikon, which is inclined increasingly toward technology development following the success in steppers, is expected to choose the next president from such graduates-- Managing Directors Nakamura and Takatsugu Sho, and Directors Shigehide Segawa, Shigeo Ono, and Shoichiro Yoshida.

The strongest candidates among them are Managing Director Sho, head of the optical machinery division and concurrently head of the Yokohama Works, born in 1927 joined the company in 1952, and Director Shoichiro Yoshida, head of the Precision Instrument Division, born in 1932, joined the company in 1956, and who is directly supervising the stepper operations.

Industrial sources regard Yoshida as the most promising candidate. But it would be reasonable to consider that Yoshida will be the president after the next president in view of the company's customary rule to place weight on seniority. This leaves Sho as the most powerful candidate. Both Sho and Yoshida have contributed to the diversification of businesses, such as steppers, rather than for the camera division. Therefore, the rumor is that it seems easy for President Fukuoka, having pursued the same course, to hand over his post to them.

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CSO: 4306/86

INDUSTRIAL TECHNOLOGY

CORPORATE FINANCIAL PERFORMANCE REPORTED

Komatsu

Tokyo TOSHI KEIZAI in Japanese Nov 85 pp 112-113

[Article: "Improved Results With Rapid Increase in Exports to U.S."]

[Text] As in the appended charts, Komatsu Ltd.'s results reached their peak in 1982, and then declined, showing a loss for 2 years in a row, through 1984. This was due completely to depressed foreign markets, and with their main market, the Near East depressed, and economic sanctions for the invasion of Afghanistan, the results reflect the influence of controls on shipments to the Soviet Union. In that connection, compared to overseas sales of Y416.3 billion in 1982, sales were only Y312.6 billion in 1984, a decline of about Y100 billion in 2 years.

However, the outlook brightened after the start of 1985. At the mid-year settlement, compared to the same last year, sales increased 1.4 percent, and operating profit by 0.4 percent, which are on the same level, but there is a change in content, and a broad recovery is expected in the second half.

The reason is that in the first half foreign markets declined 3.4 percent, and replacing the Middle Eastern market which continued its decline, there was rapid increase in U.S. markets, but not all of the losses could be covered this way. However, although the drop of the market in the Near East is believed to be about at its bottom, exports to the United States conceal potential strength for a rapid increase in the future. Because Komatsu was involved with technological cooperation with Bucyrus Erie of the United States on a power shovel, and with a wheel roader with International Harvester, also of the United States, Komatsu was prohibited from exporting those products back to the United States, and its exports had been limited mainly to bulldozers. However, in 1982 Komatsu discontinued those affiliations and switched to exporting directly itself, and has put a great effort into building a sales network. The results of this will finally be felt beginning around next year. Last year, exports to the United States were \$300 million, and compared to the \$140 million of the year before, this means they doubled in a year. Exports have already reached \$140 million in the first half of this year. These exports are virtually all in construction machinery.

Added to this, shipping of large presses for General Motors will begin during the second half of this year. The total amount for GM is a Y33 billion (24 line) contract and will be shipped this year and next. Stimulated by GM's large investment in plants, other foreign and domestic auto makers are also actively investing in equipment and orders for large presses are increasing.

In this respect, the prediction for sales of large presses in the current period is Y20 billion in the second half, a large increase over the Y7.4 billion of the first half and a the forecast is Y27.4 billion for the year (compared to Y12.3 billion for the same period last year). Backlog orders for large presses totaled Y70 billion as of the end of June, and favorable conditions for the press industry will continue for a while.

Sales of Non-Construction Equipment Nearing 25 Percent

Besides above-mentioned large presses, future growth is also expected in medium and small presses, industrial robots, laser machineries, and other manufacturing machines. Reaching the long-standing target of 25 percent in sales in other than construction equipment gives every appearance of being met next year (sales for the first 6 months of this year were only 16 percent). Investment in medium and small presses, which occurs with a background of industrial investment in plant and equipment steady increase is up to Y21 billion forecast for this year, and up from the previous year's Y20 billion.

Industrial robots mean welding robots to Komatsu, and this year's forecast for sales totals Y2 billion, 700 million in the first half, and 1.3 billion in the second half, and although still on a small scale, this is an increase of 50 percent over the previous year. Besides these, they have begun selling a new model robot which maximizes an ability to do handling work, such as tightening screws.

Laser machineries are increasingly in demand for cutting out metal patterns, and compared to first half sales of Y900 million, the second half is forecast a Y1.5 billion.

Besides these, an optical tablet and an unmanned conveyer, which was developed at Komatsu Ltd.'s Electrical Research Institute, are expected to make contributions to operations starting next year.

The research for the unmanned conveyer was done in conjunction with research for the Komatsu forklift. It is unique unmanned conveyer system in which directional control is provided by microcomputer processing of data from visual sensors which detect light reflected from 10 centimeter diameter glass beads used as guide marks set in the track of the robot path at intervals of 1 to 2 meters. These beads reflect light back in the direction from which it is shined, using the same principle as in the reflector panels used as highway dividing lines. The optical tablet is a computer input device which uses an optical sensor. When letters or graphics are drawn on the tablet using a light pen containing a light-generating diode, the tracings are displayed on a screen in the same form as they were drawn.

USSR, PRC Markets in Spotlight

With the advent of the Gorbachev government, expectations for detente are rising. When Komatsu's Soviet market was at its strongest peak the annual exports amounted to Y100 billion, but gradually declined with the blow from the economic sanctions following the invasion of Afghanistan, and last year had fallen to the 30 or 40 billion yen level. However, this year orders from the Soviet Union are brisk, and there is no doubt that a strong turnaround has occurred. Although the numbers do not reflect it clearly, the Soviet market is reported to be the largest after the United States. Exports to the PRC also, mainly large size dump trucks, increased markedly to Y20 billion this year, doubling the Y9 billion figure of last year. Shipments of color television sets and the like to the PRC have stopped because of financial difficulties in that country, but construction and other equipment will receive first priority starting next year as the PRC moves to achieve its goals in the new 5-year plan. It is reported that there is no impact yet on operations.

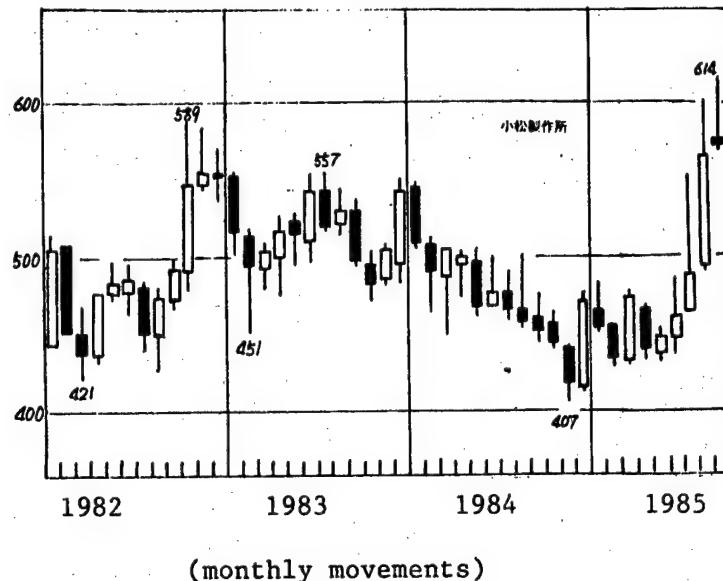
Vigorous International Strategy

In February of this year, Komatsu set up a subsidiary manufacturing company in Chattanooga Tennessee, and is currently building a factory for the manufacture of industrial machines such as laser machineries, robots and large construction equipment, starting with bulldozers, and production will start next spring. They have invested about Y4.5 billion and in 3 years they will have a factory producing Y40 billion business annually.

Paralleling this, they are moving toward the establishment of an industrial machinery sales corporation in Chicago. Formerly, Komatsu America (head office in San Francisco) handled the sales of industrial machines, but because the users of construction machinery and industrial machines are different, they will establish this new company.

Besides this, Komatsu has decided to build a construction equipment plant in Europe too, and is currently studying the selection of the prospective site. All of the European nations have levied high import tax duties on Japanese construction equipment (in Komatsu's case, from 25 to 27 percent and in reality have imposed import restrictions. In order to deal with this, it was their decision that there was no other way than to locate the factory there.

Chart 1. Komatsu Ltd.



[Factors]

1. Change to direct sales by the company has been successful, increases in sales of construction equipment in the U.S. market will continue
2. In addition, start of shipments of large size presses to GM
3. In the atmosphere of detente, orders are currently increasing from Soviet Union
4. Doubling of sales to the PRC, mainly shipments of large size dump trucks
5. Turnaround in results and increased profits phase

[How to look at stock price]

While for other stocks there is much information amply supporting a favorable reaction, a weak response is Komatsu's special characteristic. This is due to the image which the stock-holding public has, that Komatsu is a stock with a reputation of being inhospitable to stockholders.

With institutional purchasers in the background, the stock is currently breaking its listed price and volume highs, with the prospect that the Y700 level will be reached in the near future. Even at that price level it remains fairly cheap.

Chart 2. Changes in Results (in Millions of yen; yen)

| | (7) 期 | (8) 売上高 | (12) 経常利益 | (9) 純利益 | (10) 1株益 | (11) 1株配 |
|-------|----------|------------|--------------|------------|-------------|-------------|
| { 1 } | 57.12 | 652,646 | 65,062 | 32,442 | 40.5 | 8 |
| { 2 } | 58.12 | 611,364 | 56,531 | 30,640 | 37.8 | 8 |
| { 3 } | 59.12 | 575,618 | 44,341 | 23,714 | 29.1 | 8 |
| { 4 } | 60.12(予) | 595,000 | 49,000 | 26,000 | 31.8 | 8 |
| { 5 } | 59.6(中) | 290,120 | 25,059 | 12,740 | 15.7 | 4 |
| { 6 } | 60.6(中) | 294,124 | 25,162 | 13,006 | 15.9 | 4 |

Key:

| | |
|--------------------|------------------------|
| 1. 1982 Dec | 7. Period |
| 2. 1983 Dec | 8. Sales |
| 3. 1984 Dec | 9. Net Profit |
| 4. 1985 Dec (est.) | 10. Profit per share |
| 5. 1985 Jun (mid) | 11. Dividend per share |
| 6. 1986 Jun (mid) | 12. Working profit |

Fanuc

Tokyo TOSHI KEIZAI in Japanese Dec 85 p 20

[Article: "With Joint GM Venture, Aims for 30 Percent of World Robot Markets"]

[Text] The main strengths of Fanuc are in numeric control equipment, industrial robots, and electrical discharges. Numeric control devices are by far the top sales item, accounting for 80 percent of total sales. Compared to business for the year ending in the 1st quarter of 1976 Y9.3 billion, the amount for the year ending in the 1st quarter of 1985 was Y125.6 billion, a 13-fold increase in a period of 9 years. This is a very high growth rate, averaging 33 percent per year. The market share held by Fanuc numeric control devices is so large that Fanuc has 75 percent of the domestic market, and 50 percent of foreign markets.

Industrial robots were developed in 1974, and there are manufacturing robots (M series), assembler robots (A series), and special use robot (S series) types. In 1982 Fanuc and General Motors formed a joint venture, GMF. They expanded the company primarily as a supplier of OEM [original equipment manufacturing] equipment and its annual volume for the period ending in the 1st quarter of 1985 was Y14.7 billion, a 4-fold increase over the Y3.8 billion for the period ending in the 1st quarter of 1983. In the realm of discharge machines Fanuc successfully built a wire cutting discharge machine in 1975. Fanuc has about 35 percent of the market for that type of machine. Furthermore they have made progress on an emmission molding machine since the 1st quarter of 1985. Fanuc's machine differs from the oil pressure system of other firms in its electrical system.

Operations are satisfactory. For the 1st quarter of 1986, sales were Y16.5 billion, and that is an increase of 16 percent of the previous period. Working profits were Y56.0 billion, an increase of 8 percent, and for that period profit totaled Y26 billion, an estimated 4 percent over the earlier period. The outlook is for operating profits to reach a new high. Currently they are in the 1st year of a 5-year plan which is to end in 1989. The plan will increase sales in the 5 years to Y250 billion, an average annual growth rate of 12 percent, and increase the working profit ratio to more than 35 percent.

Plan for 30 Percent of World Market

The robot sector has grown to become the second pillar of Fanuc's earnings. At present the company produces 300 units per month and is operating at full capacity. About 70 percent of production is for export to the Fanuc and GM joint venture, GMF. In the previous period, GMF's sales were \$130 million (1,300 units per year level) and in the current period it is reported that sales have leaped by 80 percent. Accordingly, the company is building a new plant at its Fujimoto operation, and plans to produce an additional 500 units monthly starting in the spring of 1986.

Furthermore, Fanuc itself, working with GMF, has a plan, "Global 30," which aims to control 30 percent of the world market in the 1980's. Fanuc is preparing domestic production capabilities, and [3-fold Increase Plan] (annual production 12,000 units system) creating the base for the next generation robot, and GMF has moved from creating the software development and systems engineering organization for which it is responsible, to actual operations.

The domestic market for industrial robots was 33,000 units in 1984, and excluding manual manipulators and such, amounted to more than 10,000 units. Because production mainly has been geared to supplying GMF, the Fanuc domestic share at present is low, at the 10 percent level.

Chart 1. Industrial Robot Demand Forecast By Type of Robot

| | | Year 1990 | Year 1995 |
|------------------------|-------------|--------------------------|----------------|
| <u>Domestic Demand</u> | <u>Item</u> | <u>Type</u> | <u>Units</u> |
| | | Manual manipulators | 1,000-1,200 |
| | | Fixed Sequence Robots | 13,100-15,300 |
| | | Variable Sequence Robots | 5,900-15,300 |
| | | Playback Robots | 11,700-13,600 |
| | | Numeric Control Robots | 12,900-15,100 |
| | | Intelligent Robots | 6,700-7,800 |
| | | <u>Total Units</u> | 51,300-59,900 |
| | | | 1,400-1,700 |
| | | | 19,700-28,100 |
| | | | 7,500-10,500 |
| | | | 18,100-25,900 |
| | | | 18,200-26,100 |
| | | | 16,200-23,200 |
| | | | 81,100-115,700 |

| | Year 1990 | Year 1995 |
|--------------------------------------|-------------|--------------|
| <u>Amounts (100 millions of yen)</u> | | |
| Manual manipulators | 30-40 | 45-60 |
| Fixed Sequence Robots | 250-290 | 370-540 |
| Variable Sequence Robots | 270-320 | 340-490 |
| Playback Robots | 900-1,050 | 1,390-1,990 |
| Numeric Control Robots | 1,550-1,800 | 2,195-3,130 |
| Intelligent Robots | 600-700 | 1,460-2,090 |
| <u>Total</u> | 3,600-4,200 | 5,800-8,300 |
| Peripherals, accessories | 900-1,000 | 1,500-2,100 |
| <u>Exports</u> | 1,500-1,700 | 2,400-3,500 |
| <u>Grand Total</u> | 6,000-6,900 | 9,700-13,900 |

(Source) Japan Industrial Robot Manufacturing Association

12964/13068
CSO: 4306/76

SCIENCE AND TECHNOLOGY POLICY

ELECTRONICS AND INFORMATION-RELATED BUDGET OUTLINE REPORTED

Tokyo DENSHI KOGYO GEPPÔ in Japanese Feb 85 pp 2-12

[Article by the Electronic Policy Section, Machinery and Information Industries Bureau, MITI: "Outline of Administration of Electronics and Information Related Policies for FY 85"]

[Excerpts] In recent years, systematization of information in this country has been progressing rapidly with intraenterprise development being the most noticeable, centered around the industrial fields. However, in order to induce still more development, it becomes necessary to overcome new problems such as those listed below.

1) Adequate Measures To Cope With the Software Crisis

The software cost has been steadily increasing, and the gap between supply and demand for software has shown a tendency to increase to such a degree that the quantitative and qualitative shortages of software are becoming a social problem. It is estimated that there will be a shortage of 600,000 software engineers in FY 90, if things continue at the present rate. It is an urgent task to automate and industrialize the software production system, which is now being done in a labor intensive manner, and to educate personnel such as engineers.

2) Promoting Systematization of Information in Industry

Although the information system within business is being developed to a significant degree, construction of a full-scale system between enterprises or the like, has been delayed in spite of its recognized necessity, due to technical and monetary difficulties and to the existence of items that require further adjustments within the industry. In addition, there have been dynamic changes, such as the expansion of the gap between enterprises, strengthening of serialization within enterprises, and changes in the circulation mechanism. These are causing some people from small-to-medium enterprises to feel uneasy about the development in systematization of information. It is becoming necessary to develop carefully thought-out industrial policies such as presentation of ideas and support for construction of a large-scale information system within industry.

3) Securing the Interoperability Base for Information-Related Equipment and Systems

For future information-related equipment and systems, it is indispensable that they be mutually connectable, to be combined into a system or a network. Therefore, the lack of interoperability of the present information-related equipment and others is becoming a serious problem. It is necessary to cope with the situation by making active use of the only national standards JIS (Industrial Standardization Law), and for those areas that are difficult to standardize, to pursue the best mixture of standardization and conversion through promotion of development in technology.

4) Facilitating Systematization of Information for Regional Areas

The systematization of information in this country has been progressing in big cities, so it is feared that the gap between local areas will increasingly widen if things proceed as they do now. In order to introduce conveniences and benefits of systematization of information into every corner of the country, it is necessary to promote construction of an information system that is directly responsive to local needs and to facilitate systematization of information for regional areas.

5) Measures To Deal With Indirect Problems of Systematization of Information

In view of the present state in which systematization of information is spreading into various fields of industry and society, it becomes necessary to examine seriously computer security measures in order to ensure sound progress in systematization of information and protection of privacy.

As for the Ministry of International Trade and Industry, it is developing necessary policies in order to respond to these needs and to accomplish a smooth realization of a highly developed information society. An outline of these policies will be presented as follows:

1. Development of New Businesses by the Information Processing Promotion Association (IPA)

(1) Construction of Software Industrialized Generator and Maintenance Aids System

| <u>(Budget)</u> | <u>(Unit : Million Yen)</u> |
|--|---|
| Item | Funds from Industrial Investment for FY 85 |
| Construction of Software Industrialized Generator and Maintenance Aids System | 2,000 |
| | Government Guaranteed Loan for FY 85 |
| | 500 |

(Explanation)

1) The industrialized system for software production (SIGMA: Software Industrialized Generator and Maintenance Aids), composed of a centralized large computer and the user terminals, is a computer system supporting software production and providing software related information.

Specific services provided are: a) operating systems for software development, b) supporting tools for software development, c) research for software modules, d) research for general purpose software (ready-made software), e) technical information concerning software, f) user education function, and g) information exchange services.

Results expected from the introduction of the system are: a) to quadruple the productivity of software production, and a marked improvement in software reliability, b) to prevent duplicated development through extension of use of general purpose software, and c) fast and inexpensive procurement of abundant information.

2) Operating Funds

a) Total operating cost -- about Y25 billion (FY 85 - FY 89)
b) Operating cost for FY 85 -- Y3 billion

3) Fund Scheme

[See separate table next page]

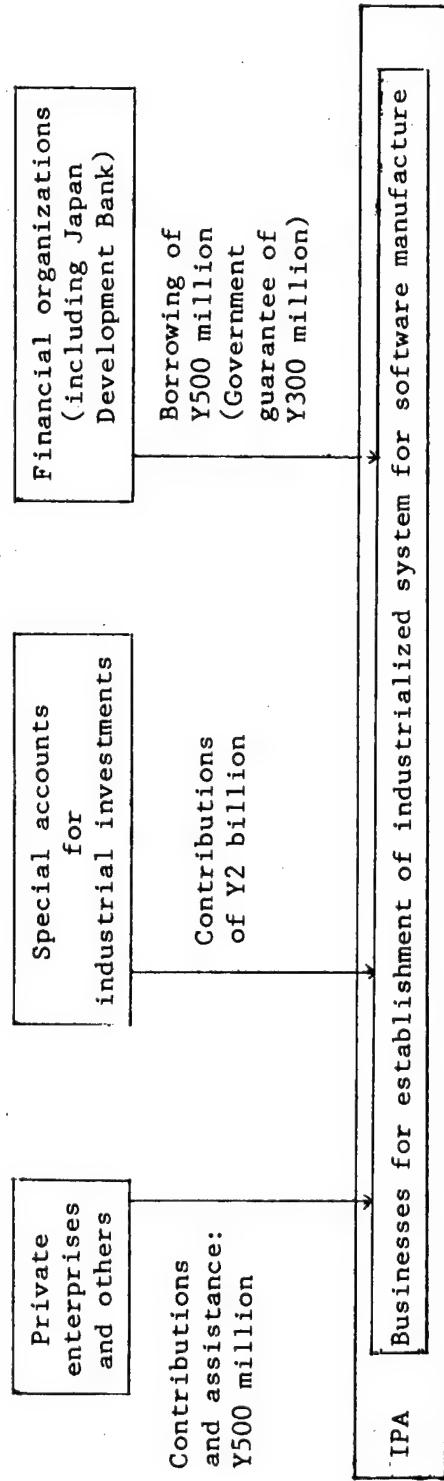
(2) Existing Software-Related Businesses

| <u>(Budget)</u> | <u>(Unit : Million Yen)</u> | | |
|---|-----------------------------|---------------------|------------------------------------|
| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
| Business Operating Cost Information Processing Promotion Association | 2,459 | 2,682 | △ 223 |
| Subsidy for Business Operation | 1,383 | 1,711 | △ 328 |

(Explanation)

When transformation to a knowledge intensive industrial structure is desired, promotion for systematization information becomes more necessary than ever

3) Fund Scheme



before. The growth of the information processing industry, which industry supports systematization of information, is an important policy concern in a situation where the technical gap between Japan and the United States remains evident. Under these circumstances, the activities of the Information Processing Promotion Association, which was established in 1970 for the purpose of promoting systematization of information and growth of the information processing industry in this country, will be further expanded and strengthened around the following businesses:

1) Promoting Development of Specified Programs

In order to expand computer utilization and accelerate program circulation, development on consignment of advanced and general purpose programs that are difficult for enterprises to develop on their own will continue to be promoted.

2) Promotion of Development Programs for Software Maintenance Techniques

Computer software requires essential maintenance work such as changes in the processing environment of hardware and operating systems, modifications and supplementing of functions for the purpose of responding to the needs of the users, and efficiency improvement. Because of this, it is estimated that the maintenance cost for software accounts for almost 70 percent of its life cycle cost.

However, maintenance is being done manually so that productivity and reliability are said to be low at present.

In order to break through such existing conditions and to improve productivity and reliability by rationalizing maintenance and by making it more efficient, an inclusive system has been developed since FY 81 under a five-year plan (at an estimated total cost of Y3.5 billion).

3) Acceleration of Development of Advanced Information Processing Techniques

For the future development of systematization of information in this country, it is necessary to develop advanced information processing techniques that fuse software techniques with other techniques in a compounded manner. For that purpose, it has been decided to promote research and development by forming an ad hoc project team composed of scientists from varied organizations such as the information processing industry, computer makers, computer users, research organizations and universities. Since the social bases of the participating scientists on the project team are different, in FY 81, a "Technical Center" was established within the Information Processing Promotion Association to uniformly promote the development of advanced information processing techniques.

(3) Businesses To Accelerate Information Systems in Small-to-Medium Enterprises

(Businesses of the Information Processing Promotion Association)

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|---|---------------------|---------------------|------------------------------------|
| Subsidy for Businesses To Accelerate Information Systems in Small-to- Medium Enterprises | 965 | 772 | 193 |

(Explanation)

In order to increase expansion of information systems for rationalizing and modernizing small-to-medium enterprises, the development of computer utilization techniques permitting small-to-medium enterprises who use computers for the first time to make use of them easily and at low cost, and the development of general purpose programs that are easy to use and accurately reflect the needs of small-to-medium enterprises, will be continued. At the same time, research and development of advanced design techniques aiming at a radical improvement in design works for small-to-medium manufacturing businesses will be continued into FY 85.

2. Promotion of Development of Advanced Technology

(1) Start of a Medium-Term Project for the Development of Basic Computer Technology

(Research and Development of Fifth Generation Computers)

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|---|---------------------|---------------------|------------------------------------|
| Development of Basic Computer Technology | 4,776 | 5,120 | △ 344 |

Judging from the uses and needs in the new fields, and the cycle for the generation change (life cycle) of computers, research and development of fifth generation computers based on new theories and technology differing from the existing Neumann-type computers, are targeted for completion in the early 1990's. Research and development in basic technology concerning the hardware and software for fifth generation computers have been in progress since FY 82 under a 3-year plan.

In the initial year for the medium-term project, during FY 85, development will be started on the component systems that will become the nucleus of fifth generation computers (inference sub-system and knowledge base sub-system).

(2) Beginning of Research and Development on Interoperable Data Base Systems
(Large-Scale Project)

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|---|---------------------|---------------------|------------------------------------|
| Research and Development on Interoperable Data Base Systems | 20 | 0 | 20 |

(Explanation)

- 1) An interoperable data base system is a data base system which is mutually operable among different information equipment and systems.
- 2) Aiming at establishing a technology base for a highly advanced information society which will come after the 1990's, development will be carried out to obtain a highly reliable, large-scale data base sharing system for different kinds of computers, with a different structure and a dispersed arrangement that can handle multi-media information such as characters, figures, images, and speeches.
- 3) Research and Development of multi-media techniques, dispersed data techniques, high reliability techniques, and inclusive system techniques indispensable to the accomplishment of the above, will be promoted energetically with cooperation between industry, universities, and the government.
- 4) For FY 85, establishment of policies for basic research and development and studies on systems for research and development will be carried out.

(3) Research and Development of High-Speed Computing Systems for Science and Technology (Large-Scale Project)

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|--|---------------------|---------------------|------------------------------------|
| Cost for Research and Development of High Speed Computation Systems for Science and Technology | 2,753 | 2,248 | 505 |

(Explanation)

Although the use of computers covers widely spread fields, in the field of science and technology, in particular, ultra-high speed computation is urgently wanted for high-speed processing of images sent from space satellites, simulation of nuclear fusion, meteorological analyses, and others. In order to be able to handle enormous amounts of computation that existing electronic computers are not capable of handling, computers with capabilities better than 10 B FLOPS (billion floating operations per second) are required.

In order to achieve the above, high-speed computation systems for science and technology will be realized by carrying out research and development on the following (Y23 billion are scheduled for FY 85 - FY 89):

- 1) Josephson junction elements (JJ elements), high electron mobility transistors (HEMT), and gallium arsenide field effect transistors (GaAs FET), as high-speed logic and memory elements.
- 2) Parallel processing system with numerous basic processors arranged for architecture.
- 3) An inclusive system equipped with large-capacity and high-speed accessible memory devices and others.
- 4) Development of Optical Instrumentation Control Systems (Large-Scale Project)

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|---|---------------------|---------------------|------------------------------------|
| <hr/> | | | |
| Cost for Research and Development of Optical Instrumentation Control Systems | 3,439 | 2,327 | 1,112 |

(Explanation)

It aims to develop a system which makes it possible to measure, transmit, and control safely and with high quality a large quantity of information such as image information, using glass fibers instead of communication cables and light instead of electricity (Y18 billion are scheduled for FY 79 - FY 86).

In FY 85 the optical instrumentation control technique will be demonstrated in the oil refining system.

(5) Research and Development of Basic Technology for Industry in the Next Generation

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|--|---------------------|---------------------|------------------------------------|
| Research and Development of Basic Technologies for Industry in the Next Generation (New Function Elements) | 1,585 | 1,478 | 107 |

(Explanation)

Aimed at firmly establishing during the 1990's the next generation industries that will form the nucleus of technology as national policy, long-term research and development are under way with the three fields of new materials, biotechnology and new function elements as basic technology, according to the "Research and Development Policy for Basic Technology for Industry in the Next Generation" which was established in FY 81.

Regarding new function elements that will make possible highly developed information processing techniques, research and development are in progress on elements that in the long run will improve the functions of existing semiconductor elements and on elements with entirely new functions, such as the super-lattice elements, three-dimensional circuit elements, and environment-proof reinforced elements.

(6) Development of Support Systems for Diagnosis and Treatment

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|--|---------------------|---------------------|------------------------------------|
| Development of Support Systems for Diagnosis and Treatment | 110 | 119 | △ 9 |

(Explanation)

Due to progress in medical technology, increase in demand for medical treatment, changes in the highly developed disease structure and others, demand for information on medical treatment such as medical knowledge, diagnostic and treatment data have been in sharp increase. On the other hand, particularly because of the delay in systematization of information on diagnostic work and treatment by doctors, the large quantity of knowledge and data are not being handled smoothly, causing a decrease in efficiency.

In order to solve these problems, by promoting the development of "Support Systems for Diagnosis and Treatment" through direct support to the diagnostic work and treatment by doctors, development of such support systems has been carried out during FY 84 following developmental investigation and conceptual design in FY 83.

During FY 85, according to the conceptual design in FY 83, and based on long-term plans since FY 84, development will be carried out on the following three sub-systems:

(a) Electronic Clinical Chart

This is the system which puts information in the clinical chart, such as details of oral diagnosis, examination data of the tested body, diagnostic opinion, treatment, and details of medical core in electronically processable form (organized into a data base); and the results are instantly given when the doctor needs them for diagnosis and treatment, with the information rearranged into a form which is easy to read as to the methods of diagnosis and treatment.

(b) Image Diagnosing System

This is a system which organizes various kinds of medical images, such as X-ray films, CT's (computed tomograms), and nuclear medicine, into a data base which can be displayed instantly when the doctor needs it for diagnosis and treatment, as well as carries out advanced image processings such as extracting the focus.

(c) Consultation System

This is a system which displays the name of the disease suspected, details of the examination and so forth, according to known engineering techniques, based on results of the examination and diagnosis to help the doctor in making decisions.

3. Development of Basic Equipment for Acceleration of Systematization of Information

(1) Acceleration of Manufacture and Use of Computers

1) Promotion of Electronic Computers

(Property Investment) (Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|--|---|--|---------------------------------------|
| Loans from Japan Development Bank to Secure Funds for Japan Electronic Computer Co. | Within framework of 79.000 for acceleration of systematization of information | Within framework of 65.000 for accelerating systematization of information | -- |

(Explanation)

With the announcement of the 308X series by IBM as a turning point, electronic computers have finally moved into a new generation (fourth generation). Since a big reduction in hardware costs is anticipated in the fourth generation, it is inevitable that more sales wars than ever before will occur. Furthermore, accompanying the announcement of the 308X series, IBM is taking an active offensive, including a big step in cutting down existing types of machines. It represents a stricter market environment for domestic makers whose sales structure is fragile.

Under these circumstances, in order to secure long-term progress in the electronic computer industry in this country, loans from the Japan Development Bank at the most favorable interest rate will continue to be given to the Japan Electronic Computer Co. (JECC) which is the joint rental company.

2) Improving Reliability of Information Equipment

(Property Investment)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|---|---|---------------------|---------------------------------------|
| Loans from Japan Development Bank To Improve Reliability of Information Equipment | Within framework of 79,000 to accelerate systematization of information | -- | -- |

(Explanation)

Systematization of information in society is progressing rapidly and defects in the information system will give rise to an extremely serious situation so that it is indispensable to greatly improve equipment, parts, materials, and so forth that constitute the information system in order to ensure reliability.

(b) Reliability of the information system required to form a healthy information-oriented society is higher than the reliability level that is achievable in private industry by means of the ordinary marketing mechanism. It is, therefore, very dangerous to let an information-oriented society expand without securing the required reliability.

(c) A financing policy will be created within the Japan Development Bank by which most favorable interest rate will be given in industrialization investments for improvement of reliability of information equipment and the like.

(2) Increased Investments by Small-to-Medium Enterprises for Systematization of Information

1) Creation of Loans for Basic Information Equipment

(Property Investment)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|--|---------------------|---------------------|---------------------------------------|
| Loans from Smaller Business Finance Corporations for Basic Equipment | | | |

| | | | |
|---|---|---|----|
| Information for Small-to-Medium Enterprises | Within framework of Y170.4 billion for other projects | Within framework of Y156.9 billion for other projects | -- |
|---|---|---|----|

(Explanation)

(a) Loan System for Acceleration of Systematization of Information in Small-to-Medium Enterprises

In order to promote a well-balanced systematization of information for society as a whole, in the future it becomes necessary to do it in small-to-medium enterprises which are weaker in management, have fewer resources, etc., compared to large enterprises.

At present, in large enterprises, computers are introduced not only as single units but also as being connectable to other computers and unable in the on-line mode. By so doing, they are aiming at a reduction in the costs of production, sales, and inventory, an improvement in productivity, an improvement in profit potential, and so on. At the same time, in the area of information and profit, an effective collection of information on customers, management, utilization, and a rapid and accurate grasping of consumer needs are taking place.

In small-to-medium enterprises, the computer system is put into the on-line mode much more slowly than in large enterprises. Therefore, conversion to the on-line mode in small-to-medium enterprises will be accelerated, and at the same time, so will the basic equipment for the small-to-medium information industry.

(b) Loan System To Accelerate the Manufacture of Information Equipment and the Like

In the field of information systems and equipment that constitute an information-oriented society which is making fast progress, small-to-medium and backbone enterprises that possess independently developed techniques of their own will play an extremely important role.

However, in these fields, technical innovation is progressing rapidly so that it is difficult for backbone enterprises to manufacture equipment that have a fixed degree of reliability.

Therefore, in the Smaller Business Finance Corporation a financing policy will be created for the purpose of accelerating the renewal of facilities in small-to-medium and backbone enterprises.

2) Loans To Accelerate Systematization of Information in Small-to-Medium Enterprises

(Property Investment)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease Δ |
|---|---|---|--|
| Loans from People's Finance Corporation | | | |
| To Accelerate Systematization of Information in Small-to-Medium Enterprises | Within the framework of Y12.55 billion for other purposes | Within the framework of Y16.45 billion for other purposes | -- |

(3) Acceleration of Systematization for Information Processing and
Communications Systems

(Property Investment)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease Δ |
|---|---|---|--|
| Acceleration of Systematization for Information Processing and Communications | Within the framework of 79,000 for acceleration of systemati- zation of information | Within the framework of 65,000 for acceleration of systemati- zation of information | -- |

(Explanation)

In order to realize a healthy information-oriented society for immediately adapting to developments in the economy, it becomes necessary to process a large quantity of information accurately, rapidly, and efficiently. For this purpose, the Japan Development Bank has been financing the facilities (including buildings) required for construction of the on-line information processing systems that are being introduced by the information processing service industry, the on-line information processing systems that are commonly used by many enterprises, and the information processing systems that are in high demand in society. In FY 85, introduction of advanced systems will be accelerated by supplementing object systems and by allowing financing at special interest rates.

<Object systems> (4) to 6) represent new systems)

- 1) On-line information processing systems used by many enterprises
- 2) On-line information processing systems used by the information processing industry and the information creating industry
- 3) Information processing systems in high demand in society
- 4) The so-called VAN and CATV of information processing type
- 5) Systems related to videotex businesses
- 6) Information processing and communications systems for local promotion

(4) Strengthening of the Foundation of the Information Processing Industry

- 1) Financing by the Japan Development Bank for Advanced Information Processing

(Property Investment)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease Δ |
|---|---|---|--|
| Financing by the Japan Development Bank for Advanced Information Processing | Within the framework of 79,000 for acceleration of systemati- zation of information | Within the framework of 65,000 for acceleration of systemati- zation of information | |

(Explanation)

This is the financing by the Japan Development Bank for automation, energy saving, sharing, and necessary facilities for education and study, in order to strengthen the country's software development power and also to advance business methods, for facilities to be used in software development, with information processing and the information creating industry as the target.

In FY 85, along with the introduction of the most favored status with special rates of interest, there will be added funds to the Information Processing Promotion Association to establish industrialized systems for software manufacture.

2) Financing Measures To Promote Information Processing

(Property Investment) (Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|---|---------------------|---------------------|---------------------------------------|
| Financing Measures to Promote Information Processing | 3,000 | 3,500 | △ 500 |

(Explanation)

Financing measures to promote information processing are necessary funds for program development and long-term operating funds that are necessary for the advancement of businesses in the information processing service industry or the like by three long-term credit banks, with acceptance of the bonds by the loan department as collateral.

The information processing industry has been chosen as an advanced strategic industry to improve citizens' lives and to study the industrial structure. In reality, however, at present its industrial base, social credibility, and so forth have not yet been established, due partly to its short history, in addition to still low technical and productive levels.

Because of this, in spite of heavy demand for funds, fund raising from general financial organizations has been difficult. Under these circumstances, the present system has been playing an important role as a powerful funds supply channel for the information processing industry and like industries.

Therefore, these financial measures will be in force continuously beyond FY 85.

3) Increased Safety Measures for Information Processing Service Industry

(Budget) (Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|--|---------------------|---------------------|---------------------------------------|
| Safety Measures and Others for Information Processing Service Industry | 12 | 13 | △ 1 |

(Explanation)

As systematization of information progresses, so does the role played by the information processing industry. Therefore, advancement of the information processing industry is planned from the basics, such as securing qualified personnel, together with plans for increased safety measures for the information processing service industry and wider use of data base services.

(5) Joint Arrangement for the Mutual Operability of Equipment and Systems Related to Information Processing

(Budget) (Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease Δ |
|---|---------------------|---------------------|--|
| Research into Trends for Unification of Interoperability Basis of Equipment and Systems Related to Information Processing | 13 | 14 | $\Delta 1$ |

(Explanation)

At present, various kinds of information processing equipment and systems are being more widely used, but there are few that possess interoperability permitting mutual connection and processing. To leave matters in such a condition is not conducive to the healthy development of systematization of information. Therefore, as an urgent task, a new investigation will be carried out to ensure interoperability. To be more specific, the following investigation will be carried out:

- 1) Current Status and Problems and the Future of Systematization of Information
- 2) Problems Connected with Acceleration of Wide-Ranging Systematization of Information to Households
- 3) Future Trends in Equipment and Systems Related to Information Processing

(6) Promotion of Data Base and Information Supply Industry

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease Δ |
|--|---------------------|---------------------|--|
| Arrangement and Promotion of Data Base and Information Supply Service | 12 | 12 | 0 |

(Explanation)

In order to promote collection and preparation of information (data base and information supply service), arrangement and promotion policies will be examined based on the results of investigation of users' needs and the supply side of the information.

(7) Investigation of Trends Related to Systematization of Information (A Part of Investigation of Trends in Advanced Technology Intensive Industry)

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease Δ |
|---|---------------------|---------------------|--|
| Cost for Investigating Trends Related to Systematization of Information (A Part of Investigation Cost of Trends in Advanced Technology Intensive Industry) | 16 | 22 | Δ 4 |

Rapid technological innovations are taking place in software with information processing techniques, and also in hardware with computers and communication related techniques. With such a background, new media such as the two-way CATV are making their appearance. The national need for such new media is becoming apparent; it is increasing, and diversifying. Under these circumstances, it becomes necessary to plan a well-balanced development of systematization of information in information collection and preparation, processing and finishing, transmission, utilization, and so forth, by ensuring efficiency and monitoring trends in users' needs. For this purpose, an investigation will be carried out on the influence of the systematization of information on industry and society, as well as an investigation on trends in advanced information processing systems such as two-way CATV whose wide use is anticipated in the future.

(8) Taxation System

1) Extension of Funds Reserved To Cover Losses in Repurchasing Electronic Computers

When the computers lent by the Japan Electronic Computer Co. and others are returned, the manufacturers will suffer a heavy loss. The expiration date of the term for funds reserved against losses suffered in repurchasing electronic computers, which are aimed at assisting management in such losses, is approaching. The deadline will be extended until the next term.

2) Extension of Funds for Programs

The term of the funds reserved for the development of general purpose programs, aimed at strengthening the development power of general purpose software for industry in the country, and establishment of the attitude treating programs as merchandise, is going to expire. It is decided that the funds will be extended for another term.

Furthermore, in order to lessen the burden for repair costs that are putting the management of the software industry in a precarious condition, a system has been instituted in which a certain fraction of program sales connected with contracts giving a special agreement for free repairs for a period of more than one year, is accumulated, left untouched for four years, and will be deducted in equal amounts in the subsequent four years. It is decided that this system will be extended for another term.

3) Legal Nominal Life of Manufacturing Facilities of Semiconductor Integrated Circuits

Integrated circuits form the nucleus of advanced technology and undergo rapid innovations, so that their manufacturing facilities quickly become technologically obsolete. Under these circumstances, the legal nominal life of manufacturing facilities of integrated circuits with over 100 elements is 5 years (it is 7 years for other integrated circuits and for individual semiconductor elements); they are regarded as "new industrial manufacturing machinery and equipment." The current system has been extended for the next 2 years (until the end of FY 86).

4) Items Related to the Development of Basic Advanced Technology

Amplification of the System for Tax Deduction of the Increase in Research Expenditures

(Current System)

Deduction from the current tax (increase in research expenditures which is research expenditures for the current term--maximum research expenditure since FY 66) X 20 percent.

(After Revision)

Deduction from the current tax (increase in research expenditures + 35 percent of the purchase price of assets for research and development in advanced basic technology) X 20 percent.

(Note) The deduction limit is the equivalent of 15 percent of the tax for the current term. (It is 10 percent according to the current system).

It is hoped that this system will accelerate the development of basic technology in the field of advanced electronics (optoelectronic techniques, advanced communications techniques, advanced information processing techniques, electronic devices techniques, techniques for circuit parts and mechanism parts, electronic materials techniques, and system control techniques).

5) Factors Involved in Strengthening the Technological Base of Small-to-Medium Enterprises

It is possible to choose between the system of deducting the increased research expenditure from the tax amount, explained in the above, and the system of deducting the research expenditures X 6 percent from the tax for the current term.

It is aimed at accelerating the development of the technological base related to systematization of information.

6) Amplification of the Tax System for Increase Investments to Change Small-to-Medium Enterprises into a New Technological Entity

The communication controlling equipment, digital PBX, ultrasonic diagnostic devices, and others will be included in the goal of the tax system to increase investments to change small-to-medium enterprises into a new technological entity.

4. Rearrangement of the Base for Local Systematization of Information

Judging from the present situation in which the information processing apparatus such as computers are installed especially in large metropolitan areas, and in the prospect that systematization of information will take place in the future in each field of industry, society, and human life, the systematization of information is also expected to develop first in large cities. Because of this, it is feared that the gap in the systematization of information between local areas will further be widened.

In order to arrive at a smooth realization of an advanced information-oriented society, it is necessary to push a balanced nationwide systematization of information by correcting local gaps.

To do this, a close look must be taken at facilities forming the basis of local systematization of information by promoting, for example, new media and community concepts.

(1) Formation of New Media Communities

(Budget)

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|---------------------------------------|---------------------|---------------------|---------------------------------------|
| Formation of New Media Communities | 74 | 96 | △ 22 |

(2) Investment in the Corporation for Promotion New Media Communities Concepts by the Center for Accelerated Research in Basic Technology (Tentative Name)

(Property Investment)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|---|----------------------|---------------------|---------------------------------------|
| Investment in the Corporation for Promotion New Media Communities Concepts by the Center for Accelerated Research in Basic Technology (Tentative Name) | Within Y2 billion | -- | -- |

Business of the Center for Accelerated Research in Basic Technology (Tentative Name)

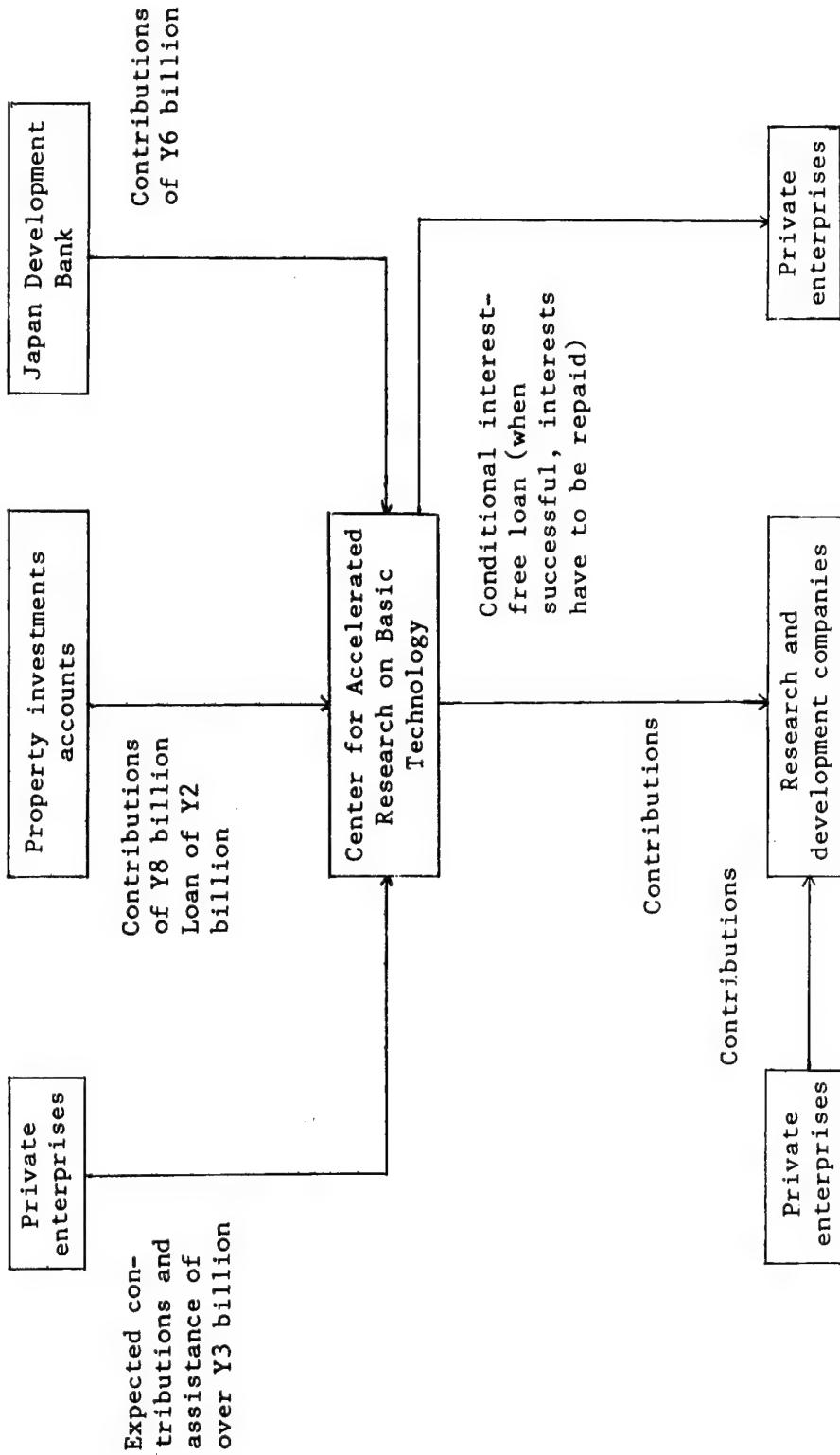
In order to accelerate technological development in the private sector, the Center for Promotion of Research in Basic Technology (tentative name), a specially approved corporation will be established in October 1985.

1) Funds Scheme (Property Investment)

Contributions from Special Funds for Industrial Investments Y8 billion (Y0 billion)

Loans from Special Funds for Industrial Investments Y2 billion (Y0 billion)

Contributions from Japan Development Fund Y3 billion (Y0 billion)



(Including the Corporation for Promotion of New Media Communities)

2) Content of the Business

(a) Loan Business

Funds needed mainly for technical development projects that start from the applied research stage.

The loan arranged will be interest free. However, when the technical development has succeeded, an interest of 7.1 percent will be charged.

(3) Acceleration of Local Systematization of Information

(Property Investment)

| Item | Budget for FY 85 | Budget for FY 84 | Relative Increase or Decrease △ |
|--|-------------------------|---------------------|---------------------------------------|
| Loans from North East Finance Corporation for Acceleration of Local Systematization of Information | Within Y1.35 billion | -- | -- |

Target Facilities

- 1) Information processing and communication systems for local promotion
- 2) Small scale on-line information processing systems among numerous enterprises
- 3) Small scale on-line information processing systems for the information processing service industry and information supplying service industry
- 4) Small scale information processing systems with high social utility
- 5) The so-called VAN and CATV of information processing type
- 6) Systems related to the videotex business

(Note) 7.3 percent interest for 1), 5), and 6)
7.6 percent interest for all others

(4) Creation of Tax System for Local Systematization of Information

It will include businesses which invest in increasing the level of various kinds of communication and information systems in model areas, the object being "Counting the Shares in the Expenditures for Special Funds as Losses."

5. Development of Policies Related to Inclusive and Methodical Systematization of Information

(1) In order to develop wide-ranging and diversified policies related to systematization of information in an inclusive and methodical manner, a law will be introduced concerning the development of information processing (tentative name) (a radical amplification of the existing "Law Concerning the Information Processing Promotion Association and Other Items") aiming at a healthy development of information systematization.

(2) A law will be introduced concerning the protection of semiconductor integrated circuits (tentative name) in order to protect the rights of the layout developers of semiconductor integrated circuits and to accelerate their development.

(3) Regarding the legal protection of software, there will be planned adjustments of opinions among various circles concerned about protecting rights, by paying attention to international harmony.

List of Budget Items for FY 85 of the Ministry of International Trade and Industry Related to Systematization of Information

(Unit : Million Yen)

| Item | Budget for FY 85 | Budget for FY 84 | Note |
|---|---------------------|---------------------|---------------------------------|
| (Budget) | | | |
| 1. Development of Basic Technology for Electronic Computers (Research and Development for Fifth Generation Computers) | 5,124 | 4,779 | First year of intermediate term |
| 2. Research and Development of Interoperable Data Base System (Large Project) | -- | 20 | New item |
| 3. Research and Development of High-Speed Computing Systems for Science and Technology (Large Project) | 2,248 | 2,753 | |

| Item | Budget for FY85 | Budget for FY84 | Note |
|---|--------------------|--------------------|---------------------------------------|
| 4. Development of Optical Instrumentation Control System (Large Project) | 2,327 | 3,438 | |
| 5. Research and Development of Basic Technology for Industry in the Next Generation | 1,478 | 1,585 | Includes new functional elements only |
| 6. Development of Support Systems for Diagnosis and Treatment | 119 | 110 | |
| 7. Workings of the Information Processing Promotion Association (the Cost Base of workings of the Information Processing Promotion Association) | 3,454 | 3,425 | |
| 8. Investigation of Trends in the Joint Arrangement for Mutual Operability Basis of Equipment and Systems Related to Information Processing | 14 | 13 | |
| 9. Investigation of Standardization Related to Information Technology | 33 | 48 | |
| 10. Increased Safety Measures and Others for Information Processing Service Industry | 13 | 12 | |

| Item | Budget for FY85 | Budget for FY84 | Note |
|---|--------------------|--------------------|--|
| 11. Cooperation in International Systematization of Information | 207 | 212 | |
| 12. Formation of New Media Communities | 96 | 74 | Added six areas |
| 13. Promotion of Data Base and Information Supply Service Industry | 12 | 12 | |
| 14. Investigation of Trends Related to Systematization of Information | 22 | 16 | |
| (Property Investment) | | | |
| 1. Amplification of Functions of Information Processing Promotion Association (Establishment of Industrialized System for Software Manufacture) [Contributions from Special Account for Industrial Investments] | -- | 2,000 | Total Business Cost for FY 85 3,000 (Details of Funds) Contributions from Industrial Investments 2,000 |
| [Financing from Non-Facility Investment from Japan Development Bank, and Others] <Financing from Japan Development Bank> | -- | 500 | Private Investments and Others 500 Financing from Japan Development Bank and Others 500 |
| 2. Allocation for Acceleration of Information Processing and Communications Systems | | | Special rate of interest |

| Item | Budget for FY85 | Budget for FY84 | Note |
|--|--|--|------------------------------------|
| 3. Allocation for Promotion of Electronic Computers | Within the framework of Y65 billion for acceleration of systematization of information | Within the framework of Y79 billion for acceleration of systematization of information (including amounts for other ministries and agencies) | Most favored special interest rate |
| 4. Allocation for Advancement of Information Processing | | | Most favored special interest rate |
| 5. Allocation for Reliability Improvement of Information Equipment and Others (Newly Created) | | | Most favored special interest rate |
| < Center for Acceleration of Research on Basic Technology > | | | |
| 6. Contributions to the Corporation for Acceleration of New Media Communities Concepts, and Others | | Within the framework of Y2 billion for contribution to the Center for acceleration of Basic Technology Research (tentative name) | |
| 7. Acceptance of Bonds for Promotion of Information Processing | | 3,000 | |

20,121/9599
CSO: 4306/1108

TELECOMMUNICATIONS

VARIOUS PLANS FOR VAN SERVICE SUMMARIZED

Tokyo NRI SEARCH in Japanese Jul 85 pp 4-7

[Article: "Various Plans for VAN and Satellite Communications Services"]

[Text] VAN

Timenet in a Hurry To Show Positive Achievements

Marubeni Corporation established Network Service Co. (an investment by 23 firms, including 16 of the Fuyo group, in December 1984 in combination with Timenet Co., the largest VAN service firm in the United States). Network Service started VAN service in March 1985 for five cities--Tokyo, Osaka, Nagoya, Fukui and Sendai--and is planning to expand into 12 within this year. Information communications between textile makers in Fukui and Marubeni's head office and branches is one of the important points.

Marubeni was the general import and sales agent for the high-data-communications system "Timenet Engine" of Timenet Co. in Japan from April 1983 until it was transferred to Network Service in April 1985.

IBM's Two-Front Operation

IBM Japan, Ltd. submitted notification for general VAN service to the Ministry of Posts and Telecommunications on 18 April 1985.

With deployment of IBM's large-scale VAN "Information Network" (IN) in Japan, it was regarded that the AST group (AST--AST General Research Institute--established in November 1983 by three companies, IBM Japan, Ltd., Mitsubishi Corporation and Cosmos Eighty Co.) would serve the role of a receiving sourcer. Since restrictions over foreign capital were lifted by the liberalization of VAN in April 1985, however, IBM Japan decided to take part in VAN service independently. Meanwhile, AST had already submitted notification for VAN service for middle and small firms in February 1985. IBM's landing operation on the VAN market in our country would be made on two fronts.

Before full-scale deployment of VAN service, IBM Japan is showing an active cooperation strategy. In April 1985, IBM Japan entered into cooperation with Secom Co. Ltd. with respect to mutual connection of the networks. In detail,

the CD's and ATM's of credit firms are connected to "SECOM-NET," which is used by the firm, Secom, and "CATNET," which is operated by IBM Japan, is connected to "SECOM-NET" through computers. "SECOM-NET" is the largest computer network, having 80,000 specified circuits in Japan and will display great power in the deployment of IBM Japan's VAN service.

In April 1985, IBM Japan agreed with Daiwa Securities Co., Ltd. on the mutual utilization of information services. The information network system called "Direct Online Securities Information Service," operated by the Daiwa Securities group, is connected to the "Remote Computing Service" network (RCS) of IBM Japan. It is the first time in Japan that pieces of information are exchanged in two ways. User convenience and economic efficiency will be greatly improved.

Furthermore, IBM Japan agreed with the Seino Transportation group on the mutual connection of VAN services. The high-speed digital communications network called "Backbone Network," which will be started in August 1985 by the Seino group, will be connected to the Japanese-type IN, "Network Management Service," which will be started in October 1985 by IBM Japan. Thus VAN users of both companies can have a consolidated information network without an increase in expenditures and manhours. It seems that IBM Japan's VAN operation is progressing steadily.

AT & T in Pursuit

Another company, which is going to introduce AT & T's large-scale VAN, "NET-1000" against IBM's "IN," is "Japan ENS Planning Co." (invested by 15 firms, established in November 1984). A starting point was the establishment of "Network Research Conference" (eight firms took part) with the Industrial Bank of Japan, Ltd., and Mitsui and Co., Ltd. as promoters, in June 1982.

Whereas "IN" is targeting IBM users, "NET-1000" features open service, which does not restrict the kinds of equipment and systems. As such, development of software such as the unification of protocol (communications procedures) and Japanese-language processing poses important problems. Japan ENS Planning Co. has requested cooperation in the implementation of Japanese version software to three big domestic computer makers, Fujitsu Ltd., Hitachi, Ltd. and NEC Corporation. Joint research and development has already been started. Japan ENS is expediting the final study to establish a joint company with AT & T.

A commercial survey company called "Internet Planning Co." was established in June 1985 by five firms: Nippon Telegraph and Telephone Corporation (NTT); NEC Corporation; Hitachi, Ltd.; Fujitsu Limited; and Nihon Keizai Shinbun, Inc. to commercialize general-purpose VAN connecting individual VAN's. They intend to strongly recommend IBM Japan's participation.

VAN's of Large Foreign Capital Companies

| | IN (IBM) | MARK-NET (GE) | NET-1000 (ATT) |
|--------------------------|---|--|--|
| Structure | Concentrated center processing type | Concentrated center processing type | Dispersed common processing type |
| Kind of object equipment | IBM machines are cores | BSC, Async terminals and the like | Not specified. Expanded from IBM machines having high general-purpose utilizations. |
| Service and software | Provides applications at centers. Connection to users' software. | Development of applications in centers. Communications service to users' software. | Users develop applications in nodes. Connection between users' software. |

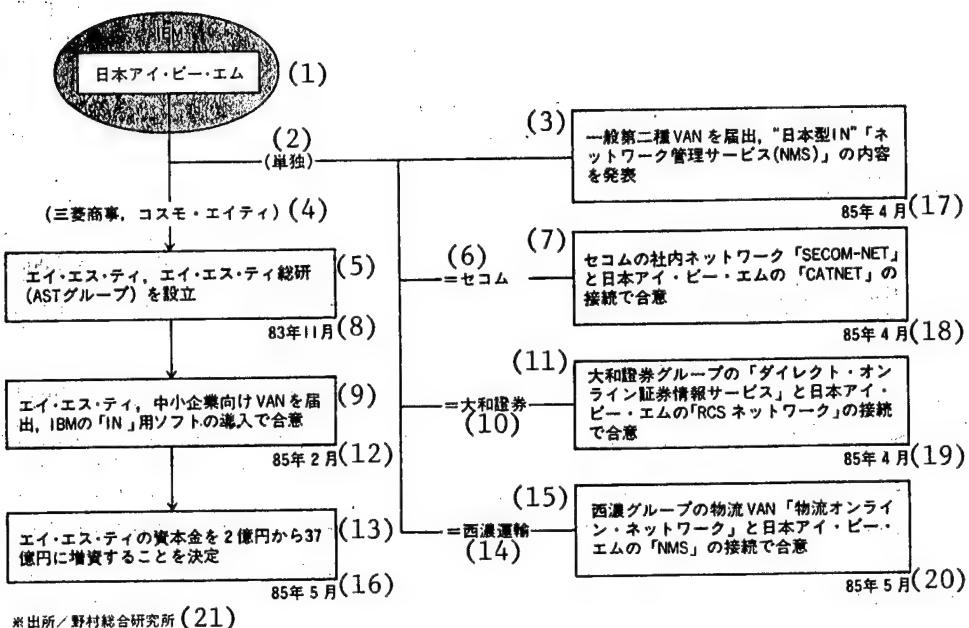
Source: KINYU ZAISEI JOHO, 26 November 1984

International VAN in Complex Competition

Intech Co., which took part in VAN's for middle and small firms as well as large-scale VAN's, is going to lead the other firms in international VAN's. Intech will set up a joint-venture company with GTE Telenet Co. of the United States, which has had cooperative relations with Intech up to now. Mutual connection of the networks is intended. Intech's "ACE-TELENET" is based on the introduction of products and technologies of GTE Corp. Therefore, there is no major problem in mutual connection. Intech started "International Research Conference" jointly with seven powerful companies in December 1984, aiming at securing users. Deployment of international VAN service is considered to be important for acquiring domestic users. NEC announced in December 1984 that it would enter the international VAN market by mutual utilization of networks in cooperation with GE (General Electric Co.). GE had provided its information service to Japanese firms through Dentsu International Information Service Co. (established in December 1975), which had been the joint venture of GE and Dentsu Incorporated up to now. Therefore, the announcement of cooperation this time was a shock. Immediately after this announcement, the Dentsu group announced that it would conclude new cooperation with GE and would take part in large-scale VAN service and international VAN service. In connection with this announcement, observation that Dentsu might increase its investment to Japan ENS has been reported, and the situation is fluid.

Hitachi announced in April 1985 that it would go into international VAN service based on cooperative relations with Timenet. Hitachi has invested in Marubeni's Network Service Co., but intends to strengthen cooperation with Timenet. With a strategy conscious of IBM in the background, NEC and Hitachi are orienting themselves toward construction of international VAN's.

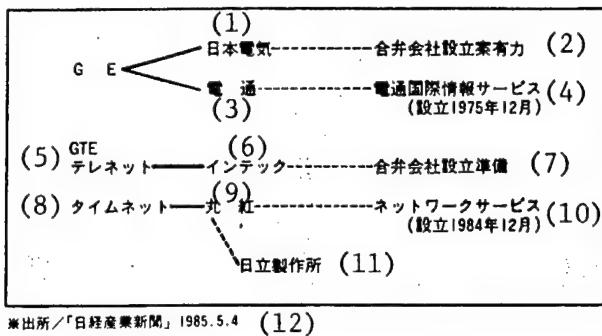
IBM's VAN Strategy



Key:

1. IBM Japan
2. Single
3. Notification of second-class general VAN was submitted. Contents of "Network Management Service (NMS)" of "Japanese-type IN" were announced.
4. Mitsubishi Corporation and Cosmos Eighty
5. AST established AST General Research Institute (AST group)
6. Secom
7. Agreement on connection of "SECOM-NET" of Secom's intra-company network and IBM Japan's "CATNET"
8. November 1983
9. AST submitted notification of VAN for medium and small firms. Agreement on introduction of software of IBM's "IN."
10. Daiwa Securities Co., Ltd.
11. Agreement on connection between Daiwa Securities group's "Direct Online Securities Information Service" and IBM Japan's "RCS Network"
12. February 1985
13. AST's capital was increased from 200 million yen to 3.7 billion yen
14. Seino Transportation Co.
15. Agreement on connection between Seino group's commodity-circulation VAN, "Commodity-Circulation Online Network" and IBM Japan's "NMS"
16. May 1985
17. April 1985
18. April 1985
19. April 1985
20. May 1985
21. Source: Nomura General Research Institute

Cooperation of Japanese Companies and Companies of the
United States Around International VAN Service



Key:

1. NEC Corporation
2. Plan for establishing a joint venture company is strongly expected
3. Dentsu Incorporated
4. Dentsu International Information Service Co. (established in December 1975)
5. GTE Telenet Co.
6. Intech Co.
7. Establishment of a joint venture company is planned
8. Timenet Co.
9. Marubeni Corporation
10. Network Service Co. (established in December 1984)
11. Hitachi, Ltd.
12. Source: NIKKEI SANGYO SHINBUN, 4 May 1985

Meanwhile, IBM announced its intention of building up full-scale international VAN service in cooperation with NTT. It is inevitable that Network Service and the AT & T group will enter international VAN service. Position-taking battles by U.S. and Japanese firms around international VAN service will be more and more heated.

Communication Satellites

Hughes Will Lead and Keep Top Position

At the Cabinet meeting for offshore-economy countermeasures held in April 1984, it was decided that foreign products would be approved for communications satellites which would be launched by private firms. With this, the problem of procuring communications satellites made in the United States came into the open.

Hughes Aircraft Co. concluded an agent contract with C. Itoh & Co., Ltd. as early as February 1984 and started full-scale sales to our country. In September 1984, Mitsui & Co., Ltd. joined the competition and agreed to establish a commercial survey company of three firms: Hughes Communications Co., a 100 percent subsidiary of Hughes Aircraft, C. Itoh, and Mitsui. On 15 February 1985, "Japan Communications Satellite Planning Co." was started.

Outlines of Three Satellite Communications Companies

| | | | | |
|---------------------|--|--------------------------------|--|-----|
| (1) 社名 | (2) 日本通信衛星 | (3) 中央通信 | サテライテ・ジャパン | (4) |
| (5) 社長 | (6) 米倉 功 (伊藤忠商事社長) | (7) 皆川広宗 (三菱商事副社長) | (8) 森園正彦 (ソニー副社長) | |
| (9) 設立 | (10) 1985年2月15日 | (11) 1985年3月19日 | (12) 1985年4月5日 | |
| (13) 資本金 | (14) 4億円 | (15) 1億円 | (16) 1億円 | |
| (17) 株主構成 (出資比率) | 伊藤忠商事(18) (40) 三井物産(19) (30) ヒューズ・コミュニケーションズ(20) | 三菱商事(21) (75) 三菱電機(22) (25) | ソニー(23) (30) 日商岩井(24) (23) 丸紅(25) (22) (26) オリエント・リース(11) 日本リース(27) (10) (28) ソニーファイナンス(4) インターナショナル | |
| (29) 衛星購入先 | ヒューズ・エアクラフト(30) | フォード・エアロスペース・コミュニケーション(31) | (32) RCAアストロ エレクトロニクス | |
| (33) 電波周波数 | (34) Kuバンド | (35) Kaバンド | (36) Ka/Kuバンド | |
| (37) 事業開始予定 | (38) 1988年2月 | (39) 1988年4月 | (40) 1988年中 | |
| (41) | ※出所/「日本経済新聞」1985.5.15(夕刊),「週刊東洋経済」1985.4.27 | | | |

Key:

1. Names of companies
2. Japan Communications Satellite Co.
3. Space Communications Co.
4. Satellite Japan Co.
5. Presidents
6. Isao Yonekura (president of C. Itoh & Co., Ltd.)
7. Hiromune Minagawa (vice president of Mitsubishi Corporation)
8. Masahiko Morizono (vice president of Sony Corporation)
9. Date of establishment
10. 15 February 1985
11. 19 March 1985
12. 5 April 1985
13. Capital
14. 400 million yen
15. 100 million yen
16. 100 million yen
17. Constitution of share holders (percentage of investment)
18. C. Itoh & Co., Ltd.
19. Mitsui & Co., Ltd.
20. Hughes Communications Co.
21. Mitsubishi Corporation
22. Mitsubishi Electric Corporation
23. Sony Corporation
24. Nissho-Iwai Company Limited
25. Marubeni Corporation

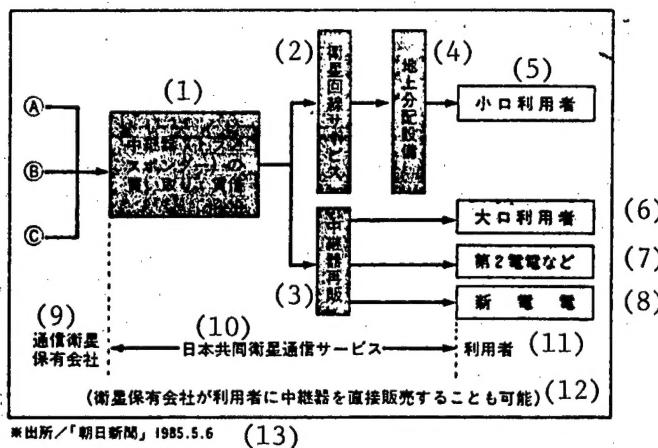
26. Orient Leasing Co., Ltd.
27. Japan Lease Co.
28. Sony Finance International Co.
29. Satellite suppliers
30. Hughes Aircraft Co.
31. Ford Aerospace & Communications Corp.
32. RCA Astro-electronics Corp.
33. Radio frequencies
34. Ku band
35. Ka band
36. Ka/Ku band
37. Date of starting operation
38. February 1988
39. April 1988
40. During 1988
41. Source: NIHON KEIZAI SHINBUN, 15 May 1985, evening; SHUKAN TOYO KEIZAI, 27 April 1985

Japan Communications Satellite was promoted to a full-scale business company on 1 April 1985 and its capital was increased to 400 million yen, which was four times the previous amount. The name was also changed to "Japan Communications Satellite Co." Japan Communications Satellite applied to the Ministry of Posts and Telecommunications for approval of a first-class telecommunications business license for radio stations, in accordance with the Radio Wave Act, on 9 April. According to the company's program, the HS393 communications satellite (1-ton class) made by Hughes Aircraft will be launched in December 1987 and April 1988 and two tracking and control stations will be installed on the ground. The No 1 satellite will start operation in February 1988 and No 2 will begin in June 1988. The company has already ordered six pieces of equipment such as TWTA's (traveling wave tubes), which are the hearts of transponders (relay devices), showing commercial confidence.

Ford and RCA in Pursuit

The No 1 competitor, which hopes to stop the Hughes group, is the Ford and Mitsubishi consortium. Mitsubishi Corporation and Mitsubishi Electric Corporation agreed to full-scale cooperation with Ford Aerospace & Communications Corp. in November 1984 on manufacturing and sales of commercial communications satellites. The big feature is that the U.S. side will manufacture 1-ton class satellites as a prime maker and the Japanese side will manufacture 0.5-ton class satellites. At first, Mitsubishi and Ford were going to bid separately in the commercial communications satellite battle. In order to cope with the Hughes group, however, a coalition policy was adopted. Mitsubishi Electric Corp., which has monopolized Japan's communications satellite market, is hoping for a chance to study new technologies. The opportunity to help solve trade friction and to develop an independent line simultaneously, is appealing.

Position of Satellite Communications Service Company



Key:

1. Procurement and lease of relay units (transponders)
2. Satellite circuits service
3. Resales of relay units
4. Ground-distribution equipment
5. Small-scale users
6. Large-scale users
7. Second telegraph and telephone companies, etc.
8. New Nippon Telegraph and Telephone Corporation
9. Communication-satellite owner companies
10. Japan Joint Satellite Communication Service Co.
11. Users
12. (Satellite owner company can directly sell relay units to users)
13. Source: ASAHI SHINBUN, 6 May 1985

Mitsubishi Corp. and Mitsubishi Electric Corp. established "Space Communications Co." on 19 March 1985 and submitted an application for approval of the business on 1 May. At present, the company is waiting for investment from Ford. Immediately after the announcement of the Ford-Mitsubishi consortium, RCA Astroelectronics Co. of the United States announced in December 1984 that it would take part in the Japanese market in cooperation with Sony Corporation. On 5 April 1985, under the sponsorship of Sony, Nissho-Iwai Company Limited, and Marubeni Corporation, "Satellite Japan, Ltd." was established, and the backdrop for competition with the two leading groups was prepared.

"Unification" Is Not Predictable

A major problem is the magnitude of the market which can be expected by communications satellite businesses. Demand for dynamic picture communications, which require a large number of circuits, is one aspect. One transponder can cover the capacity of one TV channel. About 35 transponders are mounted on a 1-ton class communications satellite. According to trial calculations, one communications satellite can cover demand for the time being.

In a situation where unification of the three groups is difficult, the unification concept of organizing user firms has emerged. Major member firms of the Japan Federation of Economic Organizations will jointly set up "Japan Joint Satellite Communications Service Co." (temporary name). The company will borrow transponders in one bundle, from the satellite communications companies, and retail the service to users. For the present, however, the three satellite groups are quietly examining the new company concept while fiercely fighting for ascendancy. Two companies, Japan Communications Satellite Co. and Space Communications Co., obtained approval for their businesses from the Ministry of Posts and Telecommunications on 21 June.

Hughes agreed with GM of the United States about its purchase of Hughes (announced on 5 June 1985) and will be reorganized into a GM subsidiary "GM Hughes Electronics Co." C. Itoh & Co., Ltd. is expecting a new company based on its belief that the communications satellite business will gain momentum.

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